(FY91 AASERT) IMPLICATIONS OF THE SMALL SCALE STRUCTURE IN THE QUIET SUN FOR THE SOLAR WIND FLOW

Air Force Grant F49620-92-J-0311

Annual Reports No. 2 and 3

For the period 1 July 1993 through 30 June 19

AFOSR-TR-96

0331

and

Final Report

For the period 1 July 1992 through 31 May 1996

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February 1996

Prepared for
United States Air Force Office of Scientific Research
Bolling AFB, D.C. 20332-6448

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The Smithsonian Astrophysical Observatory
is a member of the
Harvard-Smithsonian Center for Astrophysics

The USAF Program Manager for this Grant is Dr. Henry R. Radoski, U.S. Air Force Office of Scientific Research/NL, Building 410, Bolling AFB, D.C. 20332-6448

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE
2/21/96

3. REPORT TYPE AND DATES COVERED
Annual Reports - 7/1/93 through 6/30/95
Final Report - 7/1/92 through 5/31/96

4. TITLE AND SUBTITLE
(FY91 AASERT) IMPLICATIONS OF THE SMALL SCALE STRUCTURE IN THE QUIET SUN FOR THE SOLAR WIND FLOW

5. FUNDING NUMBERS
F49620-92-J-0311

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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Cambridge, MA 02138

8. PERFORMING ORGANIZATION REPORT NUMBER
16686540-P12S

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
United States Air Force
Air Force Office of Scientific Research/NL
Building 410
Bolling AFB, D.C. 20332-6448

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
3484/S4

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

See attached.

19960516 036

14. SUBJECT TERMS

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT

18. SECURITY CLASSIFICATION OF THIS PAGE

19. SECURITY CLASSIFICATION OF ABSTRACT

20. LIMITATION OF ABSTRACT

The AASERT Program was established to provide training for graduate and undegraduate students in the field of research complementing a program sponsored by the Department of Defense. Our parent program was sponsored by the Air Force Office of Scientific Research, and was entitled: *High Resolution Studies of the Structure of the Solar Atmosphere.* The main focus of our AASERT program, entitled *Implications of the Small Scale Structure in the Quiet Sun for the Solar Wind Flow*, has been to explore the physical characteristics of the fine scale magnetic structures in coronal holes which are believed to be the source region of the fast solar wind. Simultaneous multiwavelength observations of coronal holes made with the Extreme Ultraviolet (EUV) Spectroheliometer on *Skylab* have shown the coexistence of hot and cool material extending outwards from the solar surface. While the structures characterized by emission at temperatures above 10^6 K are known as polar plumes and extend into interplanetary space, the cooler structures, most evident at temperatures around 5×10^4 K, are called macrospicules as they are reminescent of giant spicules. The temporal variability of the emission from macrospicules is very prominent on the shortest time scale available in the data, namely one to two minutes. The variability of the emission from polar plumes is not established. The projects sponsored under this program involved both data analysis and numerical modeling. Our AASERT grant sponsored two undergraduates and one graduate student. One of the major obstacles encountered during this program was finding students enrolled at Harvard who were interested in solar physics and who would also statisfy the US citizenship requirement. Unfortunately, at the time when we were attracting excellent candidates to this program, our request for a no cost extension could not be granted.

Eric Wood, a graduate student in the Astronomy Department at Harvard, started to work on a simple model of macrospicules. We assumed a two-dimensional distribution of bipoles below the solar surface, and a density and temperature distribution above the surface. The goal was to explore the subsequent magnetic configuration taking into account the balance between magnetic and gas pressure. After working on this project for a few months during the summer, Eric decided that he did not wish to pursue a thesis in solar physics. Because of the short time spent on the project, no publication followed from that work.

Jennifer Yeh, an undergraduate in Physics at Harvard, worked on data

analysis in search of periodicities in the time variability of the emission from polar plumes. She explored limb observations made within a coronal hole region by the EUV spectroheliometer on *Skylab*. Several techniques, in particular a Fourier analysis, were used. The results of the study showed that no such periodicities were present, and that the emission was rather chaotic in nature. The difficulty encountered with the coronal emission was the low count rate in the Mg X line. Jennifer was also involved for a short time with Fe X and Fe XIV coronal emission line data obtained from Sacramento Peak Observatory during coordinated observations with the SPARTAN 201 flight on 10, 11 April, 1993.

To search for coronal hole observations, Gretchen McPhee, a first year undergraduate, prepared a catalog for the EUV/*Skylab* data. The catalog involved entering the complete list of observations with reference to wavelength, region observed, and quality of the data. Gretchen went through the 16 logbooks of the EUV/Skylab data and checked the corresponding microfiche collection to complete this catalog. Since its completion, the catalog has made the search for specific events extremely efficient.

No qualified students were available during the second year of funding.

In the third year, Kevin Berney, an undergraduate, joined our group to work on a project for his junior thesis. The subject of his thesis entailed comparing three different data sets taken from daily observations of the Sun: Kitt Peak magnetograms, He I 10830 Å spectroheliograms, and full disk x-ray pictures from Yohkoh, the Japanese-American soft X-ray telescope. The purpose of his project was to define the boundaries of coronal holes as detected in these different spectral lines, and at different heights of the solar atmosphere. The novel aspect of this work was that we found that there are many more small scale coronal holes that appear on the solar surface, as defined by their signature in He I 10830 Å than had been previously known. Such finding is extremely important for understanding the source region of the solar wind, in particular the wind originating from low latitudes, and believed to be the source region of the slow solar wind.

At the time we requested a no cost extension, a graduate student, Lorraine Allen, had started to work with us on the modeling of the flow of neutral hydrogen in the solar wind. The project involved solving multifluid solar wind equations by expanding our recently develiped multi-fluid time-dependent

code. The project is of essential importance for the intrepretation of the data from the UV Lyman α experiment on *Spartan* and the UVCS experiment on *SOHO*.